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Metropolitan District Commission Sewerage Division

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5th Annual Report



The Commonwealth of Massachusetts

for fiscal year ending June 30, 1984



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Director's Message

During this past year, the Sewerage Division of the Metropolitan District Commission has built upon the foundation of an extensive project - the clean-up of Boston Harbor. As you realize, this is no easy task. It involves the coordination and commitment of many agencies, at all levels of government, individuals, and the cities and towns inside and outside the Metropolitan Sewerage District.



This Division has continually placed major emphasis upon subsection coordination of planning, design and construction of key projects which are all essential to achieve the Commission's and this Division's objectives. Much progress on these projects has already been realized. The Nut Island Sewage Treatment Plant Immediate Upgrading is under construction and scheduled to be completed in the near future. When completed and operating, sufficient strides will be made with regards to the abatement of harbor pollution at that site.

The Deer Island Sewage Treatment Plant Fast-Track Program is also under construction. When completed, a renewed Deer Island Plant will operate efficiently and effectively; treating wastewater from the North System's member communities of the Metropolitan Sewerage District.

In addition, other projects have been undertaken by this Division. They include the Allison C. Hayes Pumping Station in Wakefield/Reading, MA, the anticipated construction of the Constitution Beach Combined Sewer Overflow Facility in East Boston, MA and the Mill Brook Valley Sewer in the Bedford, Lexington and Arlington areas. All these projects were designed to improve our services within these communities and the Metropolitan Sewerage District.

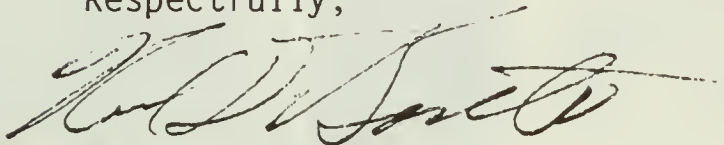
Our E.P.A. approved Industrial Waste Pretreatment Program is continuing an extensive effort to reduce and abate the discharges of heavy metals and other toxic substances entering the sanitary sewerage system. The removal of these pollutants will greatly enhance this Division's efforts to reduce industrial pollution into Boston Harbor.

We all anxiously await the formation or dissolution of legislation creating a Metropolitan Water Resources Authority and the changes it may bring about. Hopefully, its formation will provide this Division with the tools in hand to do a job mandated - collection, treatment and disposal of sewage from the 43 member communities which will result in a cleaner Boston Harbor.

As a Division, we continue to make strides in our objectives. It has been a difficult road to pass. However, the support I have received from my staff is immeasurable. Their dedication and commitment for a job well done has provided the citizens of the Commonwealth of Massachusetts and the users of the Metropolitan Sewerage District with an extraordinary value; for this I commend them all.

As always, I look forward to continuing to work with the local representatives of the member communities, citizen advisory committees and E.P.A. to achieve what I am sure is our common goal, a Division operating efficiently on sound management and engineering principles in a cost effective manner.

Respectfully,

A handwritten signature in dark ink, appearing to read "Noel D. Baratta", with a long horizontal flourish extending to the right.

NOEL D. BARATTA, P.E.
Director and Chief Engineer

NDB/kw

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ORGANIZATION

Noel D. Baratta, P.E., Director and Chief Engineer of the Sewerage Division

Principal Assistants are:

Robert J. Holthaus,	Director of Treatment Systems
Peter DeLauri,	Director of Collection Systems
George D. Gallagher,	Director of Administration
Jean M. Haggerty,	Director of Engineering
Daniel K. O'Brien,	Director of the Program Management Office
Wayne T. Grandin,	Chief Engineer of Industrial Waste

As of June 30, 1984, four hundred and forty-six (446) positions of the four hundred and fifty-six (456) positions authorized were funded to be filled in the Metropolitan District Commission, Sewerage Division. The Division is responsible for the collection, transport, pumping, treatment and disposal of wastewater on a continuous twenty-four hour per day basis and staff was assigned according to the following groupings:

Fourteen (14) positions assigned as supervisory/management.

Seventeen (17) positions assigned as clerical.

Nine (9) positions assigned for design and planning of all facilities and systems.

Twenty-three (23) positions assigned to the preparation of facility rehabilitation, contracts, sewer relief design, and industrial programs as staff engineers.

One hundred and forty-two (142) positions assigned to maintain, repair and operate the collection system. This includes sewer lines, pumping stations and combined sewer overflow (CSO) facilities.

Two hundred and thirty-eight (238) positions assigned as plant engineers, technical, laboratory, operational and maintenance personnel within the wastewater treatment service.

Thirteen (13) positions assigned to industrial waste programs as staff engineers and chemists.

The Director and Chief Engineer of the Sewerage Division has charge of the design and construction of new works, and the maintenance and operation of all the works controlled by the Metropolitan District Commission for removing and disposing of sewage from forty-three municipalities comprising the Metropolitan Sewerage District.

The work includes the maintenance and operation of ten (10) pumping stations, three (3) stormwater detention and chlorination plants, two (2) wastewater treatment plants, four (4) pretreatment headworks and 228.01 miles of Metropolitan sewers. The Metropolitan sewers receive wastewater from 5400 miles of town and city sewers at 1,823 points. The Division provides for the care and routine work of inspecting, cleaning and maintaining sewers, siphons, tide gates, and outfall sewers; the inspecting of connections to Metropolitan sewers; and the care of pumping stations, treatment plants, other buildings and grounds.

Under the Director and Chief Engineer are six (6) Sub-Directors who are responsible for a separate segment of the Division and report directly to the Director and Chief Engineer. The Sub-Directors are as follows:

Director of Treatment Systems is responsible for the operation of both Deer and Nut Island Sewage Treatment Plants, headworks, outfalls and adjacent appurtenances.

Director of Collection Systems takes the responsibility for the operation and maintenance of ten (10) pumping stations, three (3) combined sewer overflows (CSO) facilities and 228.01 miles of sewer lines.

Director of Administration is responsible for the preparation and submission of the Division's budget, the placement of all department purchase orders, the processing of Division's invoices and administering monetary control of all 16 subsidiary accounts. Further responsibilities include the handling of all Division personnel activities such as posting and filling all vacant positions, industrial accident cases and payroll of the Division. A separate activity falling under the responsibility of this section is the calculation of the Annual Cost Assessment Ratios that are used as the basis of payment for sewer service supplied to the 43 member communities by the Division.

Director of Engineering has the job duty to oversee the Division's contracts, rehabilitation of facilities, retrofit design work, and public participation of Division projects.

Director of the Program Management Office is responsible for facility planning and design of the Sewerage Division's top priority Federal and State funded projects.

Chief Engineer of Industrial Waste is responsible for all activities related to industrial waste discharges to the sanitary sewer system including the Industrial Waste Inspection, Permitting and Monitoring Programs, as well as municipal permits, septage waste discharges, application for a waiver of secondary treatment, training various personnel in hazardous waste activities and responding to citizens' complaints regarding any of the aforementioned areas of concern.

ADMINISTRATION
GEORGE D. GALLAGHER, DIRECTOR

The following is a summary of the activities of the Administration Section for the period July 1, 1983 through June 30, 1984:

FINANCIAL

Invoices, Departmental Purchase Orders, Purchase Orders and Requisitions processed from account 2430-0100 during FY 1984 - \$14,737,427.85

FY 1983 accounts payable processed from account 2430-0100 during FY 1984 - \$ 3,100,136.36

Invoices, Departmental Purchase Orders, Purchase Orders, Requisitions and Maintenance Contracts processed from account 2430-9001 during FY 1984 - \$ 1,569,687.58

A breakdown of expenditures by subsidiary account for account 2430-0100 Metropolitan Sewerage Fund:

<u>SUBSIDIARY ACCOUNT</u>	<u>FISCAL YEAR 1984 EXPENDITURES</u>
00	\$ 00.00
01	7,214,120.60
02	1,677,838.61
03	00.00
04	00.00
05	1,883.84
06	26,365.78
07	1,384,559.99
08	3,534,677.77
09	2,629.12
10	43,054.60
11	1,009.12
12	357,422.02
13	319,087.95
14	138,545.79
15	6,533.69
16	29,678.97
18	00.00
TOTAL	<u>\$14,737,427.85</u>

Personnel

60 promotional bulletins were posted and resulted in 55 personnel actions.

81 industrial accident cases were processed and forwarded to the industrial accident board for approval.

The average weekly payroll consisted of 420 employees.

Cost Assessment

The 1984 cost assessment for the Metropolitan District Commission Sewerage Division is based on the total operation and maintenance figures for Fiscal Year 1984 and total debt service requirements for Fiscal Year 1985.

Total Operation & Maintenance FY 1984	\$21,545,136
Total Principal FY 1985	<u>333,548</u>
Total Interest FY 1985	<u>5,781,461</u>
Total Debt Service FY 1985	<u>6,115,009</u>
Total MDC Sewerage FY 1984	
To be Assessed November, 1984	<u><u>\$27,660,145</u></u>

FY 1984 ASSESSMENT RATIOS IN COMPLIANCE WITH CHAPTER 92 OF THE
GENERAL LAWS AS AMENDED BY CHAPTER 814, ACTS OF 1975

<u>CITY OR TOWN</u>	<u>RATIOS FOR OPERATION AND MAINTENANCE FISCAL YEAR ENDING JUNE 30, 1984</u>	<u>RATIOS FOR PRINCIPAL AND INTEREST FISCAL YEAR ENDING JUNE 30, 1985</u>
Arlington	0.02344529	0.02208482
Ashland	0.00170671	0.00439784
Bedford	0.00537232	0.00756858
Belmont	0.01273377	0.01213237
Boston	0.30417481	0.28006348
Braintree	0.01819054	0.01712667
Brookline	0.02720705	0.02532749
Burlington	0.01058024	0.01157321
Cambridge	0.05645530	0.05140897
Canton	0.00671791	0.00901382
Chelsea	0.01281570	0.01189646
Dedham	0.01058357	0.01165777
Everett	0.01984011	0.01832099
Framingham	0.02765095	0.03104208
Hingham	0.00259551	0.00311622
Holbrook	0.00051874	0.00511321
Lexington	0.01339629	0.01420425
Malden	0.02670439	0.02481730
Medford	0.02910679	0.02704271
Melrose	0.01485752	0.01383181
Milton	0.01222021	0.01208151
Natick	0.01118015	0.01393154
Needham	0.01241979	0.01327636
Newton	0.04225695	0.03989171
Norwood	0.01722532	0.01571414
Quincy	0.04272585	0.03965711
Randolph	0.01039036	0.01299516
Reading	0.00897197	0.01035911
Revere	0.01996101	0.01937845
Somerville	0.03910573	0.03629865
Stoneham	0.01050866	0.00986792
Stoughton	0.00593500	0.01220089
Wakefield	0.01219133	0.01144239
Walpole	0.00556710	0.01088731
Waltham	0.03279554	0.03006943
Watertown	0.01742129	0.01616653
Wellesley	0.01167900	0.01253921
Westwood	0.00305845	0.00621916
Weymouth	0.01913448	0.02561089
Wilmington	0.00200886	0.00954132
Winchester	0.00923864	0.00955327
Winthrop	0.00963037	0.00895400
Woburn	0.01972043	0.02162389
TOTAL MDC	1.00000000	1.00000000

INDUSTRIAL WASTE PROGRAM
WAYNE T. GRANDIN, CHIEF ENGINEER

BACKGROUND OF THE INDUSTRIAL WASTE PROGRAM

The Industrial Waste Program was officially started in February of 1973 to acquire data on all industries within the 43 cities and towns which make up the district. The information collected on each industry inspected is a requirement of the NPDES Permits issued by the Environmental Protection Agency and State Division of Water Pollution Control to the Commission for the Deer and Nut Island Wastewater Treatment Facilities.

Presently, the Industrial Waste Program which was approved by Environmental Protection Agency in July of 1982 is being implemented in four phases; Inspections, Permitting, Monitoring and Enforcement. Each phase is described below in greater detail. In addition, the Industrial Waste Program Staff is responsible for the protection of the sewerage system from oil and gasoline, septage disposal monitoring and control, beach sampling, inflow/infiltration/surcharging problems and sewer line metering, pumping service statistical data preparation, some treatment plant monitoring, safety committee work, and assisting the Division's preparation of the annual budget.

INDUSTRIAL INSPECTIONS

The inspection program involves physical inspection of all industries in the district. It requires a discussion period with appropriate plant personnel to ascertain the type of activity being performed at the facility, the raw materials used, and the particular processes employed. A tour of the facility is also taken to verify the information received. Industries suspected of discharging a questionable waste are required to submit the results of analyses performed on representative samples of the process waste by an independent laboratory for review and evaluation. The results of analyses along with other pertinent information - (permit application, inspection reports on the industry) - are used to determine whether or not the wastes are acceptable to be discharged into the Metropolitan District Commission sewer system. A permit application must be completed by all industrial users.

Inspection of all known industries that are within the 43 cities and towns which make up the Sewerage District has been completed to date. Some of the industries within these areas are not connected to the sanitary sewer system at this time; however, these industries were inspected so that a complete record of potential discharges into the sanitary sewer system is available.

Followup inspections are performed on many of the industries initially inspected. A followup inspection would be conducted to update the

information on file, to observe a milestone such as the implementation of a phase of pretreatment or as the result of an emergency situation such as a chemical spill. As new industry moves into the Metropolitan Sewerage District, it is the responsibility of the member municipality to inform the Sewerage Division in order for the Industrial Waste Staff to inspect the industry. Member municipalities must also update the list of industries within their community on a yearly basis as required by their Municipal Permit.

As a result of information obtained from the efforts of initial and followup inspections of all known industries since the inception of the program, 744 industries were originally found to be in violation of Metropolitan District Commission Rules and Regulations. Presently 369 industries continue to be in violation of Metropolitan District Commission Rules and Regulations while the other 375 industries have either implemented pretreatment or modified their operations to comply with established standards.

Concerning the 369 industries still in violation, approximately 50 percent are what we term "paper" violations because of their failure to submit information requested by their respective Industrial User Discharge Permits. A majority of the remaining 50 percent which have actual discharge violations are in the process of implementing pretreatment or modifying their processes in an effort to achieve compliance. Any resisting industries will result in enforcement action being taken against them.

The Industrial Waste Section of the Sewerage Division utilizes a computerized data base to retrieve applicable data and generated reports. This system is run on an IBM-370, a mainframe computer. The data base is comprised of four VSAM files -- (1) city file, (2) industry file, (3) analysis file and (4) connection file. Information pertaining to the cities within the Metropolitan District Commission's jurisdiction, the industries within these cities and the analysis and connection data for these industries is stored in these VSAM files respectively.

All information which is obtained by initial plant inspections, followup plant inspections, correspondence received from industries and telephone conversations is encoded. This encoded data is then entered onto the data base. Since an up-to-date data base and current information is of such great importance, the above mentioned process is an ongoing procedure. This ensures the Industrial Waste Personnel that reports generated from the data base is accurate and, therefore, an effective means of reporting.

The computerized systems allow for up to twenty reports to be generated. These reports are useful for numerous applications including tracing the source of large spills, notifying the industries of the issuance of Federal Categorical Standards, supplying water consumption reports, listing industries whose status is "In Violation", as well as several detailed reports such as the Semi-Annual Industrial Waste Report submitted to Environmental Protection Agency and Massachusetts Division of Water Pollution Control.

In addition, the vast amount of computerized data can be used for other various programs throughout the Commonwealth such as hazardous waste, water usage, water planning and economic planning for industrial development.

Furthermore, applications and computer programs are being designed and implemented to further augment the existing system.

MUNICIPAL PERMITS/INDUSTRIAL USER DISCHARGE PERMITS

The permit program is mandated as a result of the promulgation on November 15, 1979 of revised Metropolitan District Commission Sewer Use Rules and Regulations.

Municipal Discharge Permits are issued by the Sewerage Division to each of the 43 member communities on a yearly basis. Each Municipal Discharge Permit requires the development and implementation of an Inflow/Infiltration analysis, a User Charge System and a Municipal Sewer Use Ordinance. In addition, the Permits contain conditions governing the discharge of wastewater from the municipality into the Metropolitan District Commission sewerage system, the discharge of septage and the processing of the Industrial User Discharge Permits issued jointly by the Municipality and the Metropolitan District Commission.

Industrial User Discharge Permits are issued to each industrial user located in the Metropolitan Sewer District regardless of size, type or volume of discharge. For permitting purposes, the Sewerage Division has classified industries into four categories according to the nature of their wastes. The categories are as follows:

1. Industries requiring pretreatment.
2. Industries having some toxic discharges but at concentrations which do not require pretreatment.
3. Industries which have non-toxic discharges in addition to sanitary flow.
4. Dry industries or industries with sanitary flow only.

Category 1 permits are renewed every two years, Category 2 and 3 permits every four years, and Category 4 permits every six years.

Currently, the number of permits that have been issued by category are: Category 1 - 812, Category 2 - 470, Category 3 - 701, Category 4 - 2,954.

The issuance of the industrial user discharge permit does not necessarily mean the industry is discharging an acceptable waste. In the case of an industry in violation of the regulations, the permit would contain specific

conditions as set forth by the Metropolitan District Commission that the industry must meet within a designated time frame. All permits require that changes in an industry's location, waste strength, or flow as well as any accidental discharge of prohibited or controlled materials be reported to the Metropolitan District Commission.

Industrial User Discharge Permits are revised as new information is received and much of the activity involving permits presently is due to revisions and renewals which are done on a daily basis.

INDUSTRIAL MONITORING

The industrial monitoring program was developed to maintain an inventory of the industrial wastes currently entering the system and to eliminate unacceptable concentrations of toxic and potentially deleterious substances.

Prior to sample collection by the Industrial Waste Program personnel, industry files and plans are reviewed to initially determine the type of sample required (i.e., composite or grab), the analyses to be performed and the potential sampling site. Once at the industry, the sampling team may just review basic information with the company contact (such as daily working hours and process lines currently being operated) or, as frequently occurs, a reinspection of the entire industrial facility may be performed. Often the actual conditions within the industry warrant a change in the planned sampling program, and the sampling team is called upon to make the required decisions on site regarding sample and analysis type and sampling locations.

Subsequent to collection, samples are preserved, as required, refrigerated and transported to an independent analytical laboratory, which is contracted by the Division on a yearly basis. Chain-of-Custody procedures are followed to assure proper handling of samples. Analyses performed at the laboratory may range from a simple oil and grease determination to complete priority pollutant scans. In addition to the contracted independent laboratory, the Nut Island Treatment Plant laboratory has provided valuable assistance in performing analyses in emergency situations.

The unannounced monitoring by the Metropolitan District Commission is performed in addition to self monitoring and reporting by the industries themselves as required in the Industrial User Discharge Permits. The results of the Metropolitan District Commission analyses in conjunction with information compiled in the inspection and permit programs, further assists in the determination of the acceptability of wastewater discharges and whether possible enforcement actions are warranted.

The Monitoring Section has also been called upon to perform sampling activities outside of the scope of the Industrial Waste Program. These have included specialized sampling at the treatment plants, beach sampling and on occasion soil and groundwater sampling.

COMPLIANCE AND ENFORCEMENT

Mutual cooperation between the Metropolitan District Commission and industry has been the general rule since the inception of the program. Most industries originally cited for sewer use violations have corrected their violations or are in the process of doing so. Among the thousands of industries investigated and permitted, only a few have shown a complete resistance to complying with the permit conditions and compliance schedules set forth by the Commission. In these cases, the Metropolitan District Commission has initiated enforcement procedures and taken legal action through the Office of the Attorney General of the Commonwealth. The results have been civil penalties ranging upward to \$600,000 and agreements for judgement stipulating adherence to strict implementation schedules under threat of further penalties.

Any continued violations of permit conditions will also result in enforcement action to assure compliance with the permit and existing regulations. There is also the potential for increased enforcement as additional federal categorical standards are finalized by Environmental Protection Agency.

GASOLINE IN PUBLIC SEWERS

A sanitary engineer is employed to inspect all newly constructed garages or other gasoline-using establishments to ensure that proper oil/gasoline separators are installed and maintained. Gasoline and oil separators are precautionary devices designed to prevent gasoline, oil and solids from entering the sanitary sewer. The Metropolitan District Commission issues an approved separator design and specifications accepted by the State Plumbing Code and the State Fire Marshall.

These plans are available upon request for all municipalities and industries involved. The plan includes a list of specifications and general construction notes. The Sewerage Division may occasionally accept a separator of different design and construction only if it is discussed and approved by the Division prior to construction. Spot checks are periodically made to insure proper maintenance of the separators.

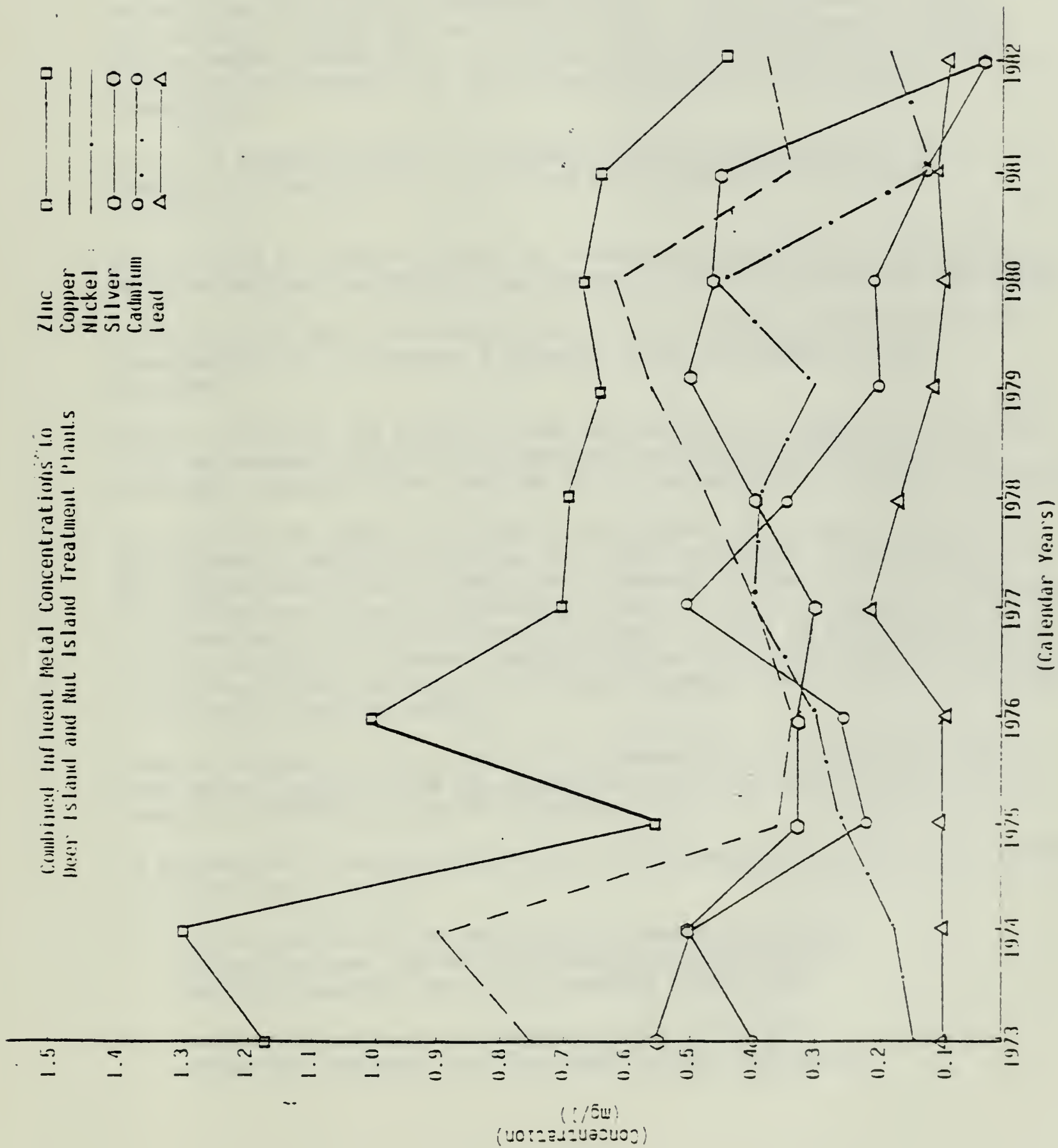
Occasionally, odors of gasoline are detected in the sewer and reported to the Department of Safety. A joint investigation with the Sewerage Division is made to minimize the impact and to eliminate a reoccurrence. During the fiscal year, 30 new separators were connected to the local sewers that discharge into the Metropolitan sewerage system and two were disconnected. Records show there are 2,654 separators currently in service at garages and other gasoline-using establishments.

ACCOMPLISHMENTS OF THE INDUSTRIAL WASTE PROGRAM

The accomplishments of the Metropolitan District Commission's Industrial

Waste Program, include, among others:

1. The elimination of numerous hazardous and unacceptable discharges to the sanitary sewer system.
2. Lowering toxic discharge concentrations from industry to within acceptable levels as determined by Federal, State and Metropolitan District Commission regulations.
3. The elimination of approximately 10.0 mgd of uncontaminated cooling water to an already overtaxed sanitary sewer system.
4. Educating industry which has led to industry implementing water conservation measures resulting in the elimination of an additional 3.0 - 4.0 mgd of waste discharged to the sanitary sewer system.
5. Working closely with Municipal Officials to resolve local industry related sewerage problems.
6. The development of an extensive data base on all hazardous waste generators throughout the Sewerage District.
7. A significant reduction in the amount of metals being discharged to the Deer and Nut Island Sewage Treatment Plants (See Figure 1).
8. The training of the Metropolitan Police of the Metropolitan District Commission and the Natural Resource Officers of the Department of Fisheries and Wildlife in hazardous/ industrial waste activities.



SEPTAGE WASTE POLICY

In 1975, the Metropolitan District Commission, Sewerage Division conducted a survey with its member communities to quantify the amount of septage entering the Metropolitan Sewerage District. The amount entering was approximately 160,000 gallons per day. Most of the septage originated from nonmember communities. Since that time, the Metropolitan District Commission has entered into contractual agreements with nonmember communities.

Policy on septage disposal is defined in the Metropolitan District Commission, Sewerage Division's Rules and Regulations, Article IV, Section 3.

By 1980, the Division realized that septage was becoming an increasingly heavy burden for the Metropolitan Sewerage System operations and facilities.

In the Fall of 1982, the Metropolitan District Commission contracted SEA Consultants, Inc. to conduct a detailed study on septage disposal practices.

After a review of the report, it was determined that septage disposal had a far more severe impact on the Metropolitan Sewerage System than was realized, especially impacting the Nut Island Wastewater Treatment Facility.

An inventory was taken of current disposal practices, indicating that approximately 189,000 gallons per day (gpd) of septage is discharged into the Metropolitan District Commission's sewerage system. Of its total, 161,300 gpd enter the South Sewerage System while the remainder, 27,500 gpd is discharged to the North Sewerage System. A total of 22 Metropolitan District Commission approved septage disposal sites were identified, with 12 of these sites tributary to the South Sewerage System and 10 discharging to the North Sewerage System.

Septage originates from a total of 51 communities in the Greater Boston area and at least ten are not authorized to use the Metropolitan District Commission sewerage system for disposal.

An evaluation of the data and review of the Sewerage Division files indicates two major problem areas:

1. Lack of control by the Metropolitan Sewerage District communities over the origin, quantity and quality of septage discharged into their sewerage system; and
2. The apparent organic overloading of the Nut Island Wastewater Treatment Facility under certain conditions.

Because of these facts, the Metropolitan District Commission has decided to limit the disposal of septage originating within member communities. By June 30, 1984, all nonmember contracts were not renewed due to these problems and because of recent court hearings.

Monitoring on a random basis is being conducted with some violations being evident at certain locations.

<u>NORTH SYSTEM +</u>		<u>SOUTH SYSTEM +</u>	
<u>CITY/ TOWN</u>	<u>ESTIMATE (GPD)</u>	<u>CITY/ TOWN</u>	<u>ESTIMATE (GPD)</u>
Arlington	360	*Abington	8,300
Bedford	2,300	Ashland	4,000
Belmont	3,600	*Avon	500
Boston	4,000	Braintree	4,000
Brookline	0	Canton	5,000
Burlington	1,600	Dedham	1,700
Cambridge	0	*Easton	10,000
Chelsea	0	Framingham	10,000
Everett	0	*Hanson	2,000
Lexington	3,500	Hingham	13,500
Malden	0	Holbrook	6,200
Medford	0	*Mansfield	4,500
Melrose	0	Milton	100
Newton	1,000	Natick	25,000
Reading	2,900	Needham	11,200
Revere	400	*Norfolk	1,700
Somerville	0	Norwood	70
Stoneham	25	Quincy	0
Wakefield	75	Randolph	6,000
Waltham	0	*Sharon	5,700
Watertown	0	Stoughton	15,400
Wilmington	6,500	Walpole	40,000
Winchester	600	Wellesley	60
Winthrop	0	*Weston	2,600
Woburn	<u>4,000</u>	Westwood	1,400
TOTALS	27,525	Weymouth	31,000
		*Whitman	4,200
		TOTALS	<u>161,260</u>

*Non-member communities

+Results from the July 1983 Septage Management Study

METROPOLITAN SEWERAGE DISTRICT

Areas and Populations

Table Shows Ultimate Contributing Areas and Present Estimated Populations
Within the Metropolitan Sewerage District.

The Population of the Cities and Towns of the District, as given in the
Table, is based on the Federal Census of 1980.

City of Town	Area (Square Miles)	Estimated Population
Arlington	4.64	48,219
Ashland	9.40	9,165
Bedford (1)	1.63	13,067
Belmont	3.79	26,100
Boston	39.19	562,994
Braintree	13.44	36,337
Brookline	5.33	55,062
Burlington	8.97	23,486
Cambridge	5.42	95,322
Canton	17.73	18,182
Chelsea	2.06	25,431
Dedham	9.54	25,298
Everett	2.91	37,195
Framingham	22.50	65,113
Hingham (2)	2.50	6,822
Holbrook	4.50	11,140
Lexington	15.77	29,479
Malden	4.23	53,386
Medford	5.98	58,076
Melrose	3.81	30,055
Milton	8.98	25,860
Natick	14.58	29,461
Needham	7.13	27,901
Newton	14.38	83,622
Norwood	10.14	29,711
Quincy	11.39	84,743
Randolph	6.25	28,218
Reading	9.01	22,678
Revere	5.55	42,423
Somerville	3.96	77,372
Stoneham	4.22	21,424
Stoughton	14.70	26,710
Wakefield	6.33	24,895
Walpole	19.99	18,859
Waltham	11.38	58,200
Watertown	3.80	34,384
Wellesley	9.89	27,209
Westwood	9.18	13,212
Weymouth	16.22	55,601
Wilmington	15.10	17,471
Winchester	5.31	20,701
Winthrop	1.59	19,294
Woburn	12.23	36,626
TOTALS	404.65	2,056,504

(1) Sewage for part of the town handled through the Town of Lexington
under special contract.

(2) The Area and Population given is only for that part of the Town
included in the Metropolitan Sewerage District.

COLLECTION SYSTEM
PETER DeLAURI, DIRECTOR

The Metropolitan Sewerage District (MSD) was created by Chapter 439 of the Acts of 1889, "to transport and dispose sewage in a safe and economical manner", which at that time was screening and final discharge to Boston Harbor.

As shown on the following table, the MSD serves forty-three (43) communities with a population of 2,056,504. The service surface area is approximately 404.65 square miles which is served by 228 miles of MSD sewers and 10 pumping stations. Member communities discharge their wastewater to this system via 1823 connections from 5,400 miles of local sewers.

Within the MSD, there are two (2) operating systems; in the North, wastewater is transported by gravity and five (5) pumping stations to the Deer Island Wastewater Treatment Plant in Winthrop. In the South, wastewater flows are also transported by gravity and five (5) pumping stations to the Nut Island Wastewater Treatment Plant in Quincy.

PUMPING SERVICE

**Average Daily Volume of Sewage Lifted at Each of the Ten
Metropolitan Sewage Pumping Stations During the Year, as
Compared with the Corresponding Volumes for the Previous Year**

PUMPING STATION	<u>Average Daily Pumpage</u>			Percent Differences (+)	
	1983 Gallons	1984 Gallons	Differences		

Alewife Brook	9,820,000	12,290,000	2,470,000	21.1	+
Braintree-Weymouth	22,410,000	23,210,000	800,000	3.5	+
Charlestown	28,390,000	27,840,000	550,000	1.9	-
East Boston	10,390,000	6,770,000	3,620,000	34.8	-
East Boston Electric	NO METER	NO METER	---	---	
Hingham	720,000	790,000	70,000	8.9	+
Hough's Neck	NO METER	NO METER	---	---	
Quincy	8,230,000	11,690,000	3,460,000	29.6	+
Reading	2,830,000	2,980,000	150,000	5.0	+
Squantum	960,000	1,060,000	100,000	9.4	+

FISCAL YEAR 1984 SUMMARY

NORTH SYSTEM

The district has an area of 168.03 square miles with a population of 1,306,485. There are five (5) pumping stations and 144.69 miles of Metropolitan District Commission sewers.

ALEWIFE BROOK PUMPING STATION

Equipment: three (3) primary, 30" mixed flow pumps driven by 440 volt, three phase, 100 hp, General Electric variable speed motors and one secondary 20" mixed flow pump driven by a 440 volt, three phase, 50 hp, squirrel cage motor.

Contract capacity of 30" pumps 26 mgd at 15' head

Contract capacity of 20" pump 12 mgd at 17' head

Average quantity pumped per day 12,290,000 gallons

Maximum quantity pumped per day 35,000,000 gallons

Minimum quantity pumped per day 5,000,000 gallons

Alternating current is furnished by the Boston Edison Company and the Town of Belmont.

CHARLESTOWN PUMPING STATION

Equipment: three (3) submerged centrifugal pumps being driven by Fairbanks-Morse diesel engines.

Contract capacity of one diesel
engine driven pump 60 mgd at 18' head

Contract capacity of two diesel
engine driven pumps 45 mgd at 11' head

Average quantity raised per day 27,840,000 gallons

Maximum quantity raised per day 64,390,000 gallons

Minimum quantity raised per day 9,410,000 gallons

EAST BOSTON PUMPING STATION

Equipment: four (4) submerged centrifugal pumps, three operable, one driven by an Enterprise diesel engine, one by a uniflow type steam engine, and one by a triple expansion steam engine of the Reynolds-Corliss type. The other triple expansion steam engine is being utilized for parts and is not operational at this time.

Contract capacity of diesel engine driven pump	100 mgd with 19' head
Contract capacity of uniflow engine driven pump	60 mgd with 24' head
Contract capacity of triple expansion engine driven pumps.....	45 mgd with 19' head
Average quantity pumped per day.....	6,770,000 gallons
Maximum quantity pumped per day.....	22,000,000 gallons
Minimum quantity pumped per day.....	2,000,000 gallons

EAST BOSTON ELECTRIC PUMPING STATION

Equipment: one 400 hp, 396 rpm. General Electric motor that drives a 50 mgd vertical centrifugal non-clog DeLaval pump at a total head of 35.4 feet, and with one 600 hp, 320 rpm, General Electric motor that drives a 75 mgd vertical centrifugal, non-clog DeLaval pump at a total head of 38.5 feet. Alternating current, 4,160 volt, three phases, is furnished by the Boston Edison Company.

READING PUMPING STATION

Equipment: two (2) submerged centrifugal pumps of 4 mgd capacity at a 75 foot head, one driven by a General Electric 100 hp, 400 volt, three phase electric motor and the other driven either by a Fairbanks-Morse 100 hp, 400 volt electric motor or by a standby Fairbanks-Morse diesel engine. Alternating current is furnished by the Town of Reading.

Average quantity pumped per day.....	2,980,000 gallons
Maximum quantity pumped per day.....	4,010,000 gallons
Minimum quantity pumped per day.....	1,290,000 gallons

SOUTH SYSTEM

The south district has an area of 236.83 square miles with a population of 750,019 and is serviced by five (5) pumping stations and 79.75 miles of Metropolitan District Commission sewers.

BRAINTREE-WEYMOUTH PUMPING STATION

Equipment: three (3) diesel engine driven horizontal centrifugal pumps. The Waukesha diesel driven pump is capable of lifting 20 mgd against a head of 42 feet, the Enterprise diesel driven pump is capable of lifting 20 mgd against a head of 40 feet and a Chicago pneumatic diesel pump is capable of lifting 20 mgd against a head of 42 feet.

Average quantity pumped per day	23,210,000 gallons
Maximum quantity pumped per day	68,830,000 gallons
Minimum quantity pumped per day	10,320,000 gallons

HINGHAM PUMPING STATION

Equipment: three (3) Fairbanks-Morse centrifugal pumps driven by 60 hp, Fairbanks-Morse induction type, wound rotor, variable speed motor and its pumping range is from 375 gpm at a head of 35 feet, to 1,000 gpd at a head of 126 feet. Alternating current, 440 volt, three phase, is supplied by the Town of Hingham.

Average quantity pumped per day	790,000 gallons
Maximum quantity pumped per day	2,800,000 gallons
Minimum quantity pumped per day	170,000 gallons

HOUGH'S NECK PUMPING STATION

Equipment: two (2) 6" vertical centrifugal pumps capable of pumping 1,000 gpm at a head of 20 feet. The pumps are driven by two 10 hp 220/400 volt, three phase motors. Alternating current 440 volt, three phase is furnished by the Nut Island Wastewater Treatment Plant.

QUINCY PUMPING STATION

Equipment: two (2) Fairbanks-Morse centrifugal pumps driven by two (2) Fairbanks-Morse diesel engines and one (1) Worthington centrifugal pump driven by an Enterprise Diesel engine.

Contract capacity of Fairbanks-Morse pumps	20 mgd with 33' head
Contract capacity of Worthington Pump...	12 mgd with 26' head
Average quantity raised per day.....	11,690,000 gallons
Maximum quantity raised per day.....	111,750,000 gallons
Minimum quantity raised per day.....	5,200,000 gallons

SQUANTUM PUMPING STATION

Equipment: two (2) centrifugal pumps, each capable of pumping 2,800 gpm at a head of 46 feet. Two are driven by 60 hp, three phase motor or in an emergency, by an 80 hp, Fairbanks-Morse diesel engine. Alternating current is furnished by the Massachusetts Electric Company.

Average quantity pumped per day.....	1,060,000 gallons
Maximum quantity pumped per day.....	7,060,000 gallons
Minimum quantity pumped per day.....	630,000 gallons

COMBINED SEWER OVERFLOWS

HISTORY OF THE PROBLEM

The Boston area, like many older cities nationwide, has a problem with sewers which were constructed as combined systems. Combined sewers collect both sanitary wastewater and stormwater runoff from streets and rooftops. This method of construction was an accepted practice until the turn of the century.

During the 1800's as Boston grew in population and residential density, the first sewer lines were constructed to drain stormwaters from cellars and streets into the nearest waterways. Modernization resulted in connections of water closets to the existing sewers to carry both excess waters and domestic wastes to the rivers and harbor tidewaters for disposal. Continued growth and residential expansion of the area created the need for a more sophisticated disposal system which would transport the wastes further away from the populace for more remote disposal to the harbor. The impact of these overflows on receiving waters causes the depletion of dissolved oxygen (DO), increased biochemical oxygen demand (BOD), deposition of solids and high levels of bacterial contamination.

PRESENT

Of the 43 member communities, there are five (5) which have combined sewers. These are Boston, Brookline, Cambridge, Chelsea and Somerville. Their combined surface area is 35,820.8 acres. One (1) inch of rain falling on this area equals 972 million gallons of water, part of which flows into the combined system. The total land area within the Metropolitan Sewerage District is approximately 259,000 acres. When a rain event of one (1) inch occurs, it amounts to a volume of 7,032,000,000.00 gallons of water. This rainfall flows into streams, rivers, lakes, storm drains, etc. It percolates through the soil and in some areas enters sewers in poor condition, or by illegal connections.

REMEDIES

There are different methods of treating CSO discharges: (1) separating sewer systems; (2) build larger interceptor systems; (3) construct treatment facilities for CSO discharges. All of these examples have been used by the Metropolitan District Commission and its member communities. It varies on what method is used because of construction costs, and the disruption within the community caused by these projects. Because of these reasons, and the affect of CSO discharges on receiving waters, the Metropolitan District Commission, Sewerage Division operates three (3) such facilities, and three (3) other stations are in design. With these facilities, the Sewerage Division has taken the initial first step in

controlling these discharges. Treatment facilities already constructed to reduce the effect of CSO discharges on receiving waters include the Cottage Farm, Charles River Estuary and Somerville Marginal Facilities.

The three projects in design are a part of the \$279 million recommended CSO control plan prepared for the Metropolitan District Commission. This major CSO Study covered an area of 32,900 acres, which was divided into four areas, with boundaries set by bodies of water, land use areas and drainage basins.

Dorchester Bay Area	-	2,900 acres
Neponset River Estuary	-	1,100 acres
Charles River Basin	-	23,000 acres
Inner Harbor Area	-	5,900 acres

This study examined many of the problems associated with CSO's social, economic, ecological, and long-range resource planning. With this study, the Division will aid its member communities in controlling a long recognized major problem plaguing the Harbor shorelines and its tributaries for more than 100 years.



METROPOLITAN SEWERAGE DISTRICT

COTTAGE FARM STORMWATER DETENTION AND CHLORINATION STATION

Dry weather flows and minor storm flows up to the capacity of the sewer line itself normally pass through the sewer line directly to Ward Street Headworks and then to Deer Island Wastewater Treatment Plant. Under storm conditions, when this sewer line capacity is exceeded, flow is retained up to a volume of 1.3 million gallons. Any amount in excess of 1.3 million gallons received by the station is screened, chlorinated and discharged to the Charles River. The design flow of the Cottage Farm Storm Water Detention and Chlorination Station is 233.1 million gallons per day.

OPERATIONAL DATA

Total Amount Treated 2,508.1 million gallons

BOD, 5 DAY

Influent - ppm.....	106.85
Effluent - ppm.....	70.88

SUSPENDED SOLIDS

Influent - ppm.....	107.38
Effluent - ppm.....	71.57

BACTERIAL RESULTS (FECAL COLIFORMS)

Effluent - mf/100 ml.....	<10
Cl ₂ residual.....	1.24

CHARLES RIVER ESTUARY POLLUTION CONTROL FACILITY

This facility is designed to treat combined sewage flow from storms up to a 5-year frequency and pump it to Boston Harbor.

The facility is two phased; a dry weather flow and storm flow pumping station. The dry weather flow phase is a 5 million gallons/day capacity sewage pumping station with discharge to a sewer in Charlestown. The storm phase which includes screens, control gates, detention tanks, and chlorination is a large pumping station with a maximum capacity of 385 million gallons/day and discharges downstream below the New Charles River Dam. The combined flow after screening is chlorinated prior to discharge.

OPERATIONAL DATA

Total Amount Treated 781.69 million gallons

BOD, 5 DAY

Influent - ppm	107.43
Effluent - ppm	84.92
% Removal	20.91

SUSPENDED SOLIDS

Influent - ppm	109.2
Effluent - ppm	90.59
% Removal.....	17.04

BACTERIAL RESULTS (FECAL COLIFORMS)

Effluent - mf/100 ml.....	<10
Cl ₂ residual - ppm.....	.93

SOMERVILLE MARGINAL FACILITY

This is a small CSO station located at the intersection of Route 93 and McGrath Highway. The method of treatment is to provide screening and disinfection of combined sewage during storm conditions. It was an early experiment in CSO design funded by EPA in 1971. It was constructed in conjunction with the Amelia Earhart Dam for the Metropolitan District Commission Parks Division. In 1981, the Sewerage Division assumed control of this facility. Presently, this station is being scheduled for upgrading to conform to today's standards.

OPERATIONAL DATA

BOD, 5 Day

Effluent - ppm	88.08
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SUSPENDED SOLIDS

Effluent - ppm	92.52
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BACTERIAL RESULTS (FECAL COLIFORMS)

Effluent - mf/100 ml.....	<10
Cl ₂ residual - ppm	0.3

METROPOLITAN SEWERAGE DISTRICT

Location, Length and Sizes of Metropolitan Sewers with
Public, Special and MDC Connections
as of June 30, 1984

City or Town	Size of Sewers	Length in Miles	Public	Special	MDC
Arlington	10" to 66"	10.00	73	242	3
Ashland (4)	--	--	2	0	0
Bedford (6)	--	--	2	0	0
Belmont (1)	30" to 36"	--	2	0	0
BOSTON					
Boston (Proper)	10' to 11'-6"	0.43	2	0	0
Brighton	12" to 7'-0"x9'-4"	9.35	18	4	3
Charlestown	12" to 6'-7"x7'-5"	3.48	15	21	0
Deer Island	4' to 11'-6"	4.46	4	2	2 (3)
Dorchester	2'-6"x2'-7" to 3'-4"	2.90	19	13	1
East Boston	12" to 10'-0"	6.78	26	10	0
Hyde Park	30" to 10'-7"x11'-7"	4.73	20	8	0
Roxbury	3'-9" to 10'-0"	5.66	18	7	0
South Boston	10'-0" to 11'-6"	5.39	2	0	1
West Roxbury	12" to 9'-3"x10'-2"	10.35	36	22	2
Braintree	8" to 48"	4.26	10	2	0
Brookline	8" to 9'-0"	2.93	7	0	0
Burlington (5)	--	--	1	0	0
Cambridge	15" to 7'-4"x11'-6"	12.57	69	23	0
Canton	18" to 60"	7.82	17	32	0
Chelsea	15" to 11'-3"x11'-3"	6.83	30	12	1
Dedham	18" to 72"	8.38	17	9	0
Dover (2)	48"	0.99	0	1	0
Everett	52" to 11'-3"x11'-3"	5.49	13	10	1
Framingham (1)	42"	0.01	3	0	0
Hingham	12" to 24"	0.14	1	0	0
Holbrook	24" to 30"	1.52	2	0	0
Hull (2)	12" to 60"	2.58	0	0	0
Lexington	15" to 33"	2.44	9	0	0
Malden	15" to 4'-6"x4'-10"	8.63	74	175	8
Medford	10" to 9'-3"x9'-3"	13.00	44	28	11
Melrose	10" to 4'-6"x4'-10"	6.09	45	149	1
Milton	8" to 11'-0"x12'-0"	7.12	41	4	0
Natick	42" to 48"	5.15	20	4	0
Needham	2'-0"x2'-3" to 54"	8.62	9	13	0
Newton	15" to 72"	5.08	25	26	1
Norwood	30" to 54"	4.67	13	15	0
Quincy	16" to 11'-3"x12'-6"	9.91	46	7	2
Randolph (1)	15" to 33"	0.01	2	0	0
Reading	16" to 63"	0.06	2	0	0
Revere	15" to 48"	0.14	3	0	0
Somerville	10" to 6'-5"x7'-2"	4.73	21	20	3
Stoneham	10" to 36"	4.04	18	5	1
Stoughton (1)	20"	--	1	0	0
Wakefield	12" to 30"	0.70	7	3	0
Walpole	2'-6"x2'-9"	--	2	0	0
Waltham	30" to 42"x48"	1.69	3	0	0
Watertown	12" to 72"	1.47	8	6	0
Wellesley	2'-0"x2'-3" to 48"	0.10	3	0	0
Westwood	30" to 36"	0.30	3	0	0
Weymouth	12" to 4'-9"x5'-0"	3.73	11	6	0
Wilmington (1)	30"	--	2	0	0
Winchester	15" to 5'-6"x5'-9"	14.41	41	24	1
Winthrop	9'-0" to 10'-0"	3.23	16	4	0
Woburn	15" to 4'-2"x4'-5"	5.64	7	10	0
TOTALS		228.0	885	917	42

(1) The Metropolitan Sewers extend but a few feet into the Town of Belmont, Framingham, Randolph, Stoughton, Walpole and Wilmington.

(2) Dover and Hull are not part of the Metropolitan Sewer District.

(3) Temporary.

(4) Ashland connected to MDC through Framingham sewers.

(5) Burlington connected to MDC through Woburn sewers.

(6) Bedford connected to MDC through Lexington sewers.

TREATMENT SYSTEMS
ROBERT J. HOLTHAUS

NUT ISLAND WASTEWATER TREATMENT FACILITY
GEORGE MARCHAM, SUPERINTENDENT

This facility has been in operation since 1952, presently serves twenty-one cities and towns, including portions of Boston, Brookline, Hingham, Milton and Newton, covering an area of 236.83 square miles, having a total population of 750,019 and a contributing population of 629,553. Five Metropolitan District Commission pumping stations are located throughout the contributing area.

The treatment processes include prechlorination, screening and grit removal for incineration, pre-aeration of the influent for a 20 minute period, primary sedimentation and post-chlorination of plant effluent prior to discharge through three 60" outfall pipes into Nantasket Roads channel.

Treatment of the raw sludge is accomplished by modified high rate digestion. Two primary tanks, which have fixed covers, and two secondary tanks with floating covers are equipped to maintain continuous recirculation of the tank contents. The digested sludge is disposed of through a 12" submarine pipe line which extends a distance of 4.2 miles from the treatment plant into deep tidal water on the south side of Presidents Road. Gas produced by the digestion process is the principal source of fuel for all plant power and heating purposes.

The Division has scheduled a series of projects (with some already in progress) to upgrade several areas at the Nut Island Facility. These projects will bring several treatment processes designed in the late 1940's to today's level of technology. Such improvements will include odor control, sedimentation tanks, all electrical systems, laboratory upgrading, incinerator improvements, improved chlorination, replacement of floating digester roofs with improved mixing and heating of digested sludge.

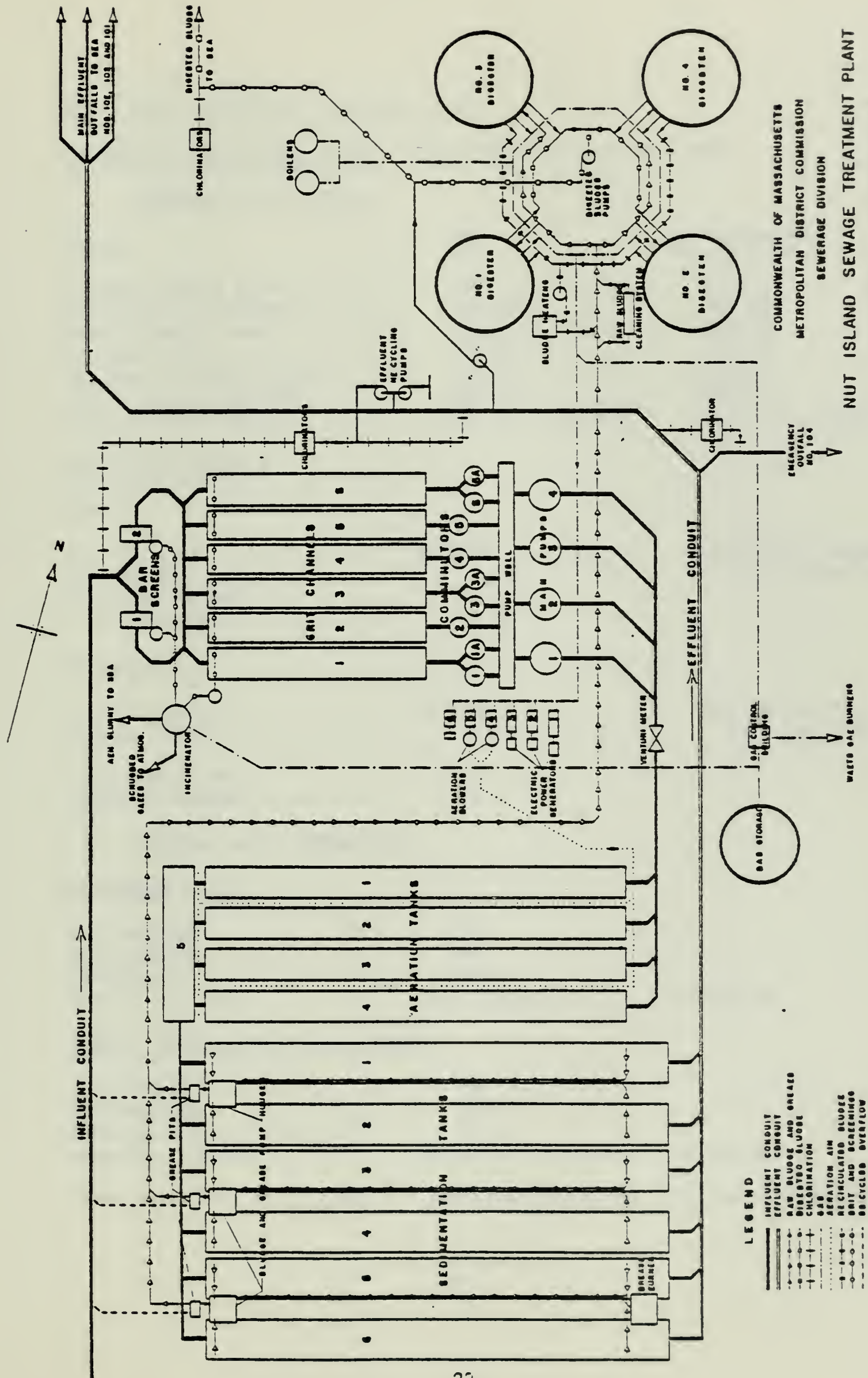
Besides providing wastewater treatment, this facility through its laboratory conducts an extensive beach monitoring program each summer. The program maintains constant monitoring of key problem areas that can affect water quality during the bathing season. When a problem is detected, local health officials are notified so appropriate measures can be instituted.

Plant personnel conduct tours of the facility throughout the year for schools, colleges and local community groups.

TO NUT ISLAND

THE TOTAL AND CONTRIBUTING POPULATIONS ALONG WITH THE ULTIMATE SEWERED AREA
OF EACH CITY OR TOWN CONTRIBUTING TO NUT ISLAND SEWAGE TREATMENT PLANT

CITY OR TOWN	TOTAL POPULATION 1980 FEDERAL CENSUS	CONTRIBUTING POPULATION	ULTIMATE SEWERED AREA SQUARE MILES
Ashland	9,165	2,933	9.40
Boston (Part of)	144,126	143,981	16.96
Braintree	36,337	35,610	13.44
Brookline (Part of)	21,419	21,312	3.95
Canton	18,182	11,891	17.73
Dedham	25,298	21,225	9.54
Framingham	65,113	52,807	22.50
Hingham	6,822	5,268	2.50
Holbrook	11,140	991	4.50
Milton (Part of)	23,713	22,219	8.56
Natick	29,461	21,507	14.58
Needham	27,901	23,883	7.13
Newton (Part of)	47,079	45,996	8.11
Norwood	29,711	29,562	10.14
Quincy	84,743	84,319	11.39
Randolph	28,218	20,825	6.25
Stoughton	26,710	12,046	14.70
Walpole	18,859	5,695	20.16
Wellesley	27,209	23,427	9.89
Westwood	13,212	5,747	9.18
Weymouth	55,601	38,309	16.22
TOTALS	750,019	629,553	236.83



COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT COMMISSION
SEWERAGE DIVISION
NUT ISLAND SEWAGE TREATMENT PLANT
FLOW DIAGRAM

NUT ISLAND WASTEWATER TREATMENT PLANT

SUMMARY OF OPERATIONAL DATA: July 1, 1983 to June 30, 1984

I - SEWERAGE FLOW PROCESS

<u>FLOWS</u>	<u>MGD</u>	<u>CU. METERS/DAY</u>
Minimum Hourly Rate.....	70*	264.95*
Minimum 24 Hour Rate.....	92.22*.....	349.05*
Average Daily Rate.....	155.56.....	588.79
Design Rate.....	112.00.....	424.00
Maximum 24 Hourly Rate.....	277.16.....	1,049.05
Design Hourly Maximum.....	230.00.....	871.00
Total for the Year.....	56,850.16 M. gals..	215.18 cu.m/year

HEADWORKS REMOVALS

Grit:

Cu. Ft. total.....	30,889.....	874.78 cu. meters
Cu. Ft./MG.....	.54.....	4.04 cu.m/M cu.m
Volatile Content as Collected.....	17.0%	

Screenings:

Cu. Ft. total.....	15,603.....	441.88 cu. m
Cu. Ft./ M gals.....	.27.....	2.02 cu. m/M cu. m

Incinerator Ash:

Volatile content, %.....	0.0
--------------------------	-----

II - AVERAGE DAILY OPERATIONS

SUSPENDED SOLIDS

Influent-ppm.....	130	
Effluent-ppm.....	46	
Removal, %.....	64.6	
Removal, lbs/day.....	108,979 lbs.....	49,433 kg

GREASE, PETROLEUM ETHER SOLUBLES

Influent-ppm.....	88	
Effluent-ppm.....	38	
Removal, %.....	56.8	
Removals, lbs/day.....	64,869 lbs.....	29,425 kg

*Flow was (0.0) on 11/15/83 for installation of new chlorination system.

SETTLEABLE SOLIDS

Influent-ml/l.....	6.05
Effluent-ml/l.....	0.89
Removal,%.....	86.8%

BOD, 5 DAY

Influent-mg/l.....	106	
Effluent-mg/l.....	74	
Removal,%.....	30.2	
Removal, lbs/day.....	41,516 lbs.....	18,832 kg

BACTERIAL CONCENTRATION

Influent, Total Coliform/100 mls.....	15,139,000
Effluent, Total Coliform/100 mls.....	247
% Kill.....	99.99%
Influent, Fecal Coliform/100 mls.....	879,000
Effluent, Fecal Coliform/100 mls.....	18
% Kill.....	99.99%

CHLORINE REQUIREMENT

Effluent-ppm.....	5.9 mg/l
-------------------	----------

CHLORINE USAGE (Total including Pre, Post, and Harbor Line Usage)

Applied, mg/l.....	8.88 mg/l	
Average Daily tons.....	5.77.....	5,234 kgs
Total Yearly tonnage.....	2,105.7.....	1,910,296 kg/year

CHLORINE RESIDUAL

Effluent-ppm.....	1.9 mg/l
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III - SLUDGE COLLECTION AND DIGESTION PROCESSES

RAW SLUDGE

Total solids content, % after primary settling.....	5.60%
--	-------

Added to Digesters

Volume (X1000).....	89,605.73 gal.....	339.16 co. meters
Dry Weight (X1000).....	41,937.0 lbs.....	19,023.0 kg

Volatile solids content, %.....	77.6	
Dry Weight (X1000).....	32,519.0 lbs.....	14,751 kg
Grease, skimmings excluded, pet. ether		
soluble content, %.....	13.46	
Dry Weight (X1000).....	5,710.60 lbs.....	2,590 kg
Alkalinity, mg/l.....	590	
pH.....	5.40	
Sand content, %.....		
Dry Weight (X1000).....	13.8	
	5,807 lbs.....	2,634 kg

DIGESTED SLUDGE (Mass balance of digested sludge, scum and bottle samples)

Total solids, %.....	2.69	
Volume withdrawn (X1000).....	87,859.5 gal.....	332.55 cu.meters
Dry wt. withdrawn (X1000).....	19,654 lbs.....	8,915 kg
Volatile solids content, %.....	54.3	
Dry wt. withdrawn (X1000).....	10,674 lbs.....	4,842 kg
Grease, Pet. ether soluble, %.....	12.0	
Withdrawn (X1000).....	2,303.0 lbs.....	1,045.0 kg
Sand Content, %.....	30.7	
Withdrawn (X1000).....	6,027.0 lbs.....	2,734.0 kg
Alkalinity, mg/l.....	2,250.0	
pH.....	7.2	

DIGESTION EFFICIENCY

Reduction:

Total solids destroyed, %.....	50.2	
Dry Weight (X1000).....	21,009.2 lbs.....	9,530 kg
Volatile solids destroyed, %.....	64.7	

DIGESTER SCUM WITHDRAWAL

Solids (X1000).....	2,701.8 lbs.....	1,226 kg
Grease (X1000).....	397.1 lbs.....	180 kg
Non-saponifiable (X1000).....	216.9 lbs.....	98 kg

DIGESTER LOADINGS

Detention Time (Design):

#1 Digester and #3 Digester: 25 days
 #2 Digester and #3 Digester: 21 days

Estimated detention time based on raw sludge feedings, sludge withdrawals, and estimated working volumes:

#1 Digester and #3 Digester: 33 days

#2 Digester and #3 Digester: 29 days

Unit Loadings, Solids Loadings:

#1 Digester: .139 dry lbs/cu.ft./day....2.20 dry kg/cu.meters/day

#2 Digester: .176 dry lbs/cu.ft./day....2.82 dry dk/cu.meters/day

#3 Digester: .073 dry lbs/cu.ft./day....1.16 dry kg/cu.meters/day

Volatile Solids Loadings:

#1 Digester: 0.108 Vol.dry lbs/cu.ft./day....1.72 Vol. dry kg/cu.m./day

#2 Digester: 0.136 Vol.dry lbs/cu.ft./day....2.19 Vol. dry kg/cu.m./day

#3 Digester: 0.056 Vol.dry lbs/cu.ft./day....0.90 Vol. dry kg/cu.m./day

DIGESTER SLUDGE GAS

Total Produced (X1000)..... 332,671 cu.ft..... 9.421 cu.meters
(Lab estimation)

Cu. ft/lb of solids added..... 8.02

Cu.m/kg of solids added..... 0.5

Cu.ft/lb of volatile solids..... 10.33

Cu.m./kg of vol.solids added..... 0.65

Cu.ft./lb of solids destroyed..... 15.87

Cu.m./kg destroyed..... 0.99

Gas Quality

Methane,%..... 62.1

Carbon Dioxide%..... 37.9

Hydrogen Sulfide, grains/100 cu.ft.. 16

SODA ASH

Usage, tons/year..... 85

DEER ISLAND WASTEWATER TREATMENT FACILITY
STEVEN J. KRUGER, SUPERINTENDENT

The Deer Island Facility, in operation since June 1968, serves 22 communities and portions of Boston, Brookline, Newton and Milton. The area served by this treatment plant is 168.03 square miles with a total population of 1,306,485 and a contributing population of 1,248,472. Five Metropolitan District Commission pumping stations are located throughout the contributing area.

As shown in the diagram on the following page, the Deer Island Facilities include three remote headworks, located respectively in Chelsea, Roxbury and South Boston which are connected to the Deer Island main pumping station by two deep rock tunnels. The tunnel from the Chelsea Creek Headworks is approximately four miles and the one from Ward Street and Columbus Park Headworks is approximately seven miles long. An additional facility, the Winthrop Terminal Facility, located on the plant site, provides sewerage services for the local area and is connected to the Deer Island Plant through a separate pump discharge.

The treatment processes include screening and grit removal (at all headworks), aeration of the influent for a ten minute period, primary sedimentation and post-chlorination of the plant effluent prior to discharge through two submerged outfalls into Presidents Road's channel.

Treatment of raw sludge is accomplished by separate sludge thickening prior to high rate digestion.

Under the direction of the Division's engineering staff, several key projects have begun to improve and modernize this facility. Construction on several of these projects have started. The Division is certain that when all these projects are accomplished, it will improve plant efficiency, adding to the Division's goal in having a cleaner harbor. For an example, such projects will include rehabilitation of the four digesters, including covers and mixing systems, gas compressors, chlorine feed lines, alternate power source, electric driven pumps, sedimentation tank collection system, etc.

Services provided by the Deer Island Facility include an extensive beach sampling program during the summer months to insure public safety and monitor problem areas that effect water quality.

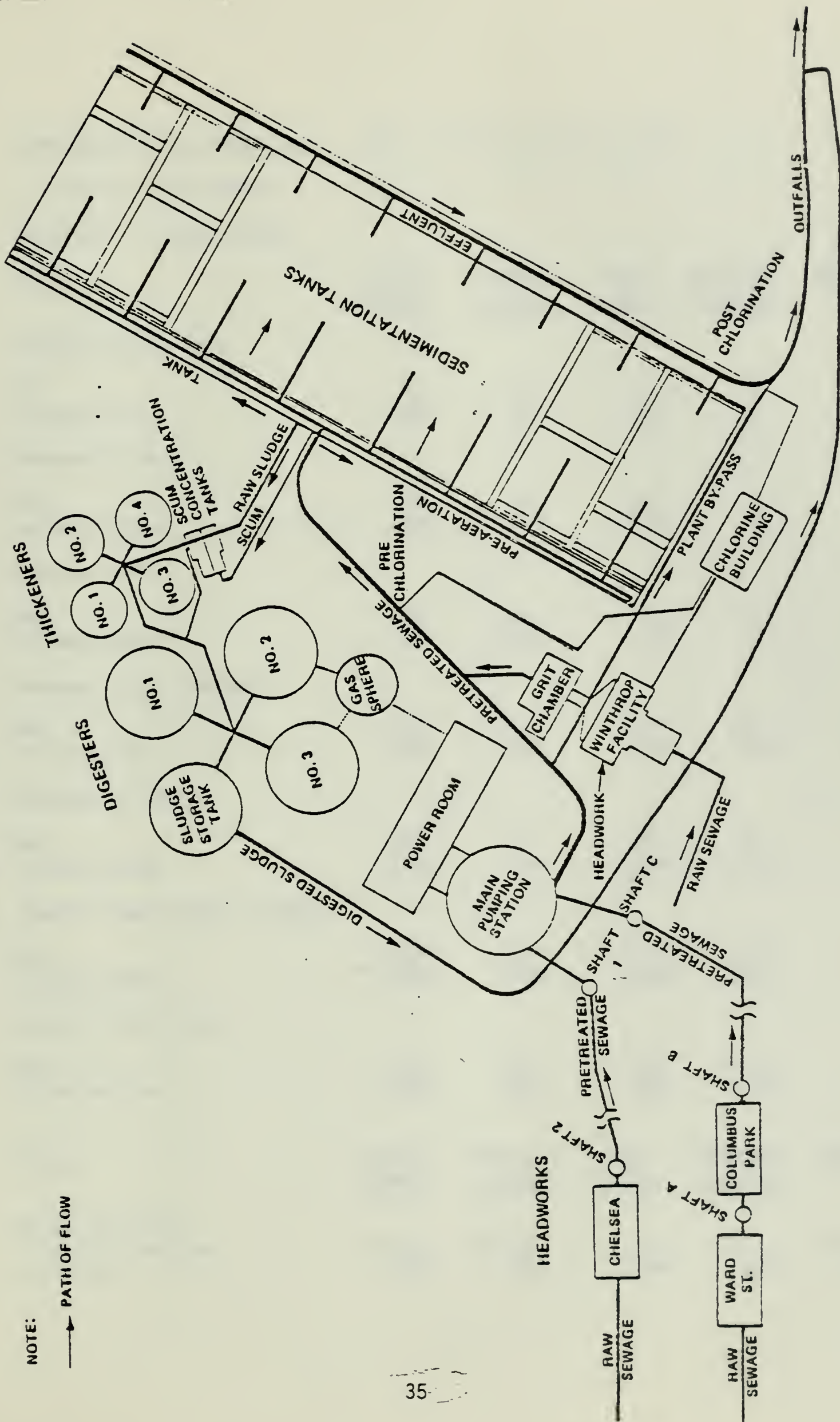
TO DEER ISLAND

THE TOTAL AND CONTRIBUTING POPULATIONS ALONG WITH THE UNTIMATE SEWERED AREA
OF EACH CITY OR TOWN CONTRIBUTING TO DEER ISLAND SEWAGE TREATMENT PLANT

CITY OR TOWN	TOTAL POLULATION 1980 FEDERAL CENSUS	CONTRIBUTING POPULATION	ULTIMATE SEWERED AREA SQUARE MILES
Arlington	48,219	47,438	4.64
Bedford	13,067	6,886	1.63
Belmont	26,100	25,317	3.79
Boston (Part of)	418,868	416,198	22.23
Brookline (Part of)	33,643	33,475	1.38
Burlington	23,486	19,376	8.97
Cambridge	95,322	94,845	5.42
Chelsea	25,431	25,304	2.06
Everett	37,195	37,009	2.91
Lexington	29,479	25,352	15.77
Malden	53,386	53,119	4.23
Medford	58,076	57,786	5.98
Melrose	30,055	29,905	3.81
Milton (Part of)	2,147	1,908	0.42
Newton (Part of)	36,543	35,535	6.27
Reading	22,678	18,210	9.02
Revere	42,423	40,514	5.55
Somerville	77,372	76,985	3.96
Stoneham	21,424	21,124	4.22
Wakefield	24,895	24,571	6.33
Waltham	58,200	57,909	11.38
Watertown	34,384	34,212	3.80
Wilmington	17,471	210	15.13
Winchester	20,701	18,507	5.31
Winthrop	19,294	19,198	1.59
Woburn	36,626	27,579	12.23
TOTALS	1,306,485	1,248,472	168.03

NOTE:

→ PATH OF FLOW



SUMMARY OF OPERATIONAL DATA: July 1, 1983 to June 30, 1984

I - SEWAGE FLOW PROCESS:

Headworks - Pretreatment

<u>Flows</u>	<u>Chelsea Creek</u>	<u>Columbus Park</u>	<u>Ward Street</u>	<u>Winthrop Facility</u>	<u>TOTAL</u>
Minimum Hourly Rate					
MGD	50	25	35	0	
Cu.Meters/day	189K	95K	132K	0	
Minimum 24 Hour					
MGD	88	40	46	1	
Cu.Meters/day	333K	151K	174K	4K	
Average Daily					
MGD	152	62	84	12	310
Cu.Meters/day	575K	235K	318K	45K	1173K
Average Daily (Design)					
MGD	(140)	(66)	(113)	(24)	(343)
Cu.Meters/day	530K	250K	428K	91K	1298K
Maximum 24 Hour					
MGD	305	112	139	50	
Cu.Meters/day	1154K	424K	526K	189K	
Maximum Hourly Rate (Design)					
MGD	(350)	(182)	(256)	(60)	
Cu.Meters/day	1325K	689K	969K	227K	
Maximum Hourly Rate					
MGD	340	190	195	100	
Cu.Meters/day	1287K	719K	738K	378K	
<u>Flows</u>	<u>Chelsea Creek</u>	<u>Columbus Park</u>	<u>Ward Street</u>	<u>Winthrop Facility</u>	<u>TOTAL</u>
Total for Year --					
Million Gallons	55,610	22,845	30,748	4,317	113,520
Cu.Meters	210M	86M	116M	16M	430M

<u>Removals</u>	<u>Chelsea Creek</u>	<u>Columbus Park</u>	<u>Ward Street</u>	<u>Winthrop Facility</u>	<u>TOTAL</u>
Grit:					
Cu.Ft.	19,291	7,753	17,600	2,383	47,027
Cu.Meters	546	219	499	67	1,331
Cu.Ft./M.Gal.	0.35	0.34	0.57	0.55	0.41
Cu.Meters/M.Cu.Met.	2.60	2.54	4.30	4.19	3.10

Screenings:

Cu.Ft.	28,287	12,250	33,840	5,234	79,611
Cu.Meters	801	347	958	148	2,254
Cu.Ft./M.Gal.	0.51	0.54	1.10	1.21*	0.70
Cu.Meters/M.Cu.Met.	3.81	4.03	8.26	9.25*	5.24

Main Plant - Primary Treatment

<u>Flows</u>	<u>MGD</u>	<u>Cu.Meters/day</u>
Minimum Hourly Rate	110	416K
Minimum 24 Hour	196	742K
Average Daily	310	1173K
Average Daily (Design)	343	1298K
Maximum 24 Hour	534	2021K
Maximum Hourly Rate	560	2119K
Maximum Hourly Rate (Design)	925	3500K
Total For Year	113,520M gals.	430M Cu.Meters

* Includes amounts from dewatering sedimentation tanks
³
K - denotes units of 10
⁶
M - denotes units of 10

Suspended Solids

Influent - ppm	130	
Effluent - ppm	77	
Removal, %	41	
Removal, lbs/day	137,000	62,100 kg

Settleable Solids

Influent - ml/l	3.9
Effluent - ml/l	1.6
Removal, %	59

BOD, 5 Day

Influent - ppm	150	
Effluent - ppm	105	
Removal, %	30	
Removal, lbs/day	116,000	52,600kg

Bacterial Concentration

Influent - Total Coliforms/100 ml	36,000,000	
Effluent - Total Coliforms/100 m.	592	
% Kill	99.998	

Chlorine Requirement

Influent - ppm	6.2	
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Note: The chlorine requirement fluctuates greatly because of significant salt water infiltration occurring at high tides.

Chlorine Usage

Applied - ppm	7.7	
Average Daily, tons	9.89	8,975kg
Total for year, tons	3,621	3,285,000kg

Chlorine Residual

Effluent - ppm	0.8	
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II SLUDGE COLLECTION AND DIGESTION PROCESS

Raw Sludge

Total solids content % after thickening	5.1	
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Added to Digesters

1000 gallons	86,451	327K Cu.Meters
1000 dry lbs.	36,727	16,659,000K kg
Volatile solids content, %	71	
Volatile solids content, 1000 dry lbs.	26,076	11,828,000K kg
Alkalinity - ppm	490	
pH	5.9	

Digested Sludge

Total solids content, %	3.2	
Withdrawn, 1000 gals	95,874	363K Cu.Meters
Withdrawn, 1000 lbs	25,556	11,592,000K kg
Volatile solids content, %	62	
Withdrawn, 1000 dry lbs.	15,845	7,187,000K kg
Alkalinity as calcium carbonate - ppm	790	
pH	5.6	

Digestion Efficiency*

Reduction

Total solids destroyed %	30
1000 dry lbs.	11,171
	5,067K kg

Volatile solids destroyed %	39
1000 dry lbs.	10,231
	4,641K kg

* During the entire period covered by this report a major rehabilitation project at the Digester Complex was ongoing.

PROJECT PLANNING AND MANAGEMENT
JEAN M. HAGGERTY, DIRECTOR OF ENGINEERING

The Project Planning and Management Staff is responsible for the overall management of all Sewerage Division planning, design and construction contracts. Composed of engineers, planners, draftsmen and clerical staff, this group ensures that contracts are undertaken as needed, are sufficiently supervised to stay on schedule and within budget and are completed in a timely, professional manner. Tracking systems are in place to aid the project planning and management personnel in the proper monitoring and control of contract milestones, in the expeditious payment of consultant and contractor fees and in the continuous processing of Federal and State grant requests and reimbursements.

It is the major function of this group to correct immediate operational deficiencies and to coordinate these short-term projects with long-range needs of the Division in order to guarantee continued reliable functioning of the Metropolitan District Commission sewerage system.

The following section lists the contracts begun or in force during fiscal year 1984.

DEER ISLAND SEWAGE TREATMENT PLANT

Contract No. S80-0605

Installation of 2,000 Horsepower Electric Motor for Sewage
Pump Drive for the Deer Island Sewage Treatment Plant

This contract was awarded on July 16, 1980 to Engineering Construction, Inc. of Magnolia, Massachusetts in the amount of \$226,069.00. The Contractor started work on July 28, 1980. After numerous delays, the motor was placed in operation in December, 1981. Additional work was authorized in 1982 and the contract was accepted as substantially complete in May, 1983.

Contract No. S81-0951-S1B

Sludge Management Study Update

This contract was awarded to Havens and Emerson, Inc. at a cost of \$777,300.00 in April, 1980 which, as a result of amendments, now totals \$846,856.00. The contract was signed on December 11, 1980 and the study was not completed at the end of fiscal year 1984.

Design of Contract No. S82-1003
Rehabilitation of Digesters No. 1&2, Deer Island
Sewage Treatment Plant, Boston, Massachusetts

This contract was awarded to O'Brien and Gere Engineers, Inc. of Syracuse, New York on September 22, 1981. The total design cost is not to exceed \$377,101.00. The contract was signed March 4, 1982 and was not completed at the end of fiscal year 1984.

Construction of Contract No. S82-1003
Rehabilitation of Digesters No. 1, 2, 3, and 4, Deer Island
Sewage Treatment Plant, Boston, Massachusetts

This contract was awarded to Peabody N.E., Inc. on February 3, 1983. The total construction bid price is \$3,394,832.00. The contract was signed February 17, 1983 and was not completed at the end of fiscal year 1984.

Construction of Contract No. S82-1015
Replacement of Chlorine Piping and Diffusers,
Deer Island Sewage Treatment Plant

This contract was awarded to Harding & Smith, Inc. of Norwood, Massachusetts on September 29, 1983 for a bid price of \$211,739.00. This contract was later amended on May 10, 1984 to read \$213,539.00. Work was not completed at the end of fiscal year 1984.

Design of Contract No. S82-1016
Electrical Equipment Upgrade, Deer Island
Sewage Treatment Plant

This consultant contract was awarded to Alonzo B. Reed, Inc. of Boston, Massachusetts. The Commission signed the agreement on May 31, 1984 for a bid price of \$184,484.00. Work was not completed at the end of fiscal year 1984.

Phase I of Contract No. S82-1020
Upgrade Deer Island, Phase I, Deer Island
Sewage Treatment Plant

This contract was awarded to Havens and Emerson/Parsons Brinkerhoff on April 21, 1983. The total study cost is not to exceed \$1,741,996.00. The contract was signed March 14, 1983 and work was not completed at the end of fiscal year 1984.

Contract No. S83-1027-D1A
Rebuild Thickener Turntable Assemblies, Deer
Island Sewage Treatment Plant, Boston, Massachusetts

This consultant contract with Tighe and Bond/SCI was signed by the Commission April 14, 1983. The study cost amount is \$70,438.00. Work was not complete at the end of fiscal year 1984.

Construction of Contract No. S83-1031
Clean the Aeration Channels, Deer Island
Sewage Treatment Plant

This contract was awarded to R. Zoppo Company, Inc. of Avon, Massachusetts. The Commission signed the contract on September 22, 1983 for a bid price of \$26,000.00. The project, however, was terminated on November 1, 1983 due to operational problems. Actual final payment to the Contractor was \$8,570.21 and work was accepted as complete on December 8, 1983.

Construction of Contract No. S83-1093
Replacement of Engine Silencers, Deer Island
Sewage Treatment Plant, Boston, Massachusetts

This contract was awarded to Enterprise Equipment Company on January 20, 1983. Total construction was not to exceed \$119,900.00. The contract was signed on February 10, 1983 and was accepted as complete on September 16, 1983.

NUT ISLAND SEWAGE TREATMENT PLANT

Contract No. S80-0656-S1A
Site Options Study, Treatment System

This study contract with Metcalf & Eddy, Inc. of Boston, Massachusetts was signed by the Commission on October 31, 1980 for a total cost not to exceed \$1,369,800.00. The study, however, is on hold until EPA completes the Supplementary Draft Environmental Impact Statement. Work was not completed at the end of fiscal year 1984.

Design of Contract No. S80-0656-D1A
Immediate Upgrading Design Contract,
Nut Island Sewage Treatment Plant

This contract with Metcalf & Eddy, Inc. of Boston, Massachusetts was signed by the Commission on January 13, 1983 for a total cost not to exceed \$918,886.28. It was later amended on September 13, 1983 to read a new total of \$1,192,920.50 due to additional scope of services. Work was ongoing at the end of fiscal year 1984.

Contract No. S80-0656-C1
Improvements to Diesel Engines and Engine Support Equipment
Nut Island Sewage Treatment Plant

This construction contract was awarded to Harding & Smith, Inc. of Norwood, Massachusetts. The contract is dated October 6, 1983 for the bid price of \$1,160,870.00. Work was not complete at the end of fiscal year 1984.

Contract No. S80-0656-C2
Ventilation and Odor Control for the Main Building
Nut Island Sewage Treatment Plant

This contract was awarded to Joseph P. McCabe, Inc. of South Boston, Massachusetts. The Commission signed the contract on January 26, 1984 for a total of \$843,793.00 which was later amended to \$847,271.00. The work is ongoing and was not accepted as complete at the end of fiscal year 1984.

Contract No. S80-0656-C3
Improvements to Grit Room and Incinerator Tower Electrical
Systems, Nut Island Sewage Treatment Plant

This contract was awarded to the Chappy Corporation of Chelsea, Massachusetts. The total bid price is \$184,700.00 and the Commission signed the contract on November 10, 1983. The work was not complete at the end of fiscal year 1984.

Contract No. S80-0656-C4
Improvements to Treatment Process Equipment
Nut Island Sewage Treatment Plant

This contract was awarded to Gaffny Plumbing and Heating Corporation, D/B/A Gaffny Corporation Contractors, for a total bid price of \$897,485.00. The Commission signed the contract on February 9, 1984. The work was ongoing at the end of fiscal year 1984.

Design of Contract No. S80-0854
Alternate Power Source, Nut Island
Sewage Treatment Plant

This contract with Wright Pierce Architects/Engineers, Inc. was signed on May 27, 1982 for a bid price of \$35,437.00. The contract was amended on June 14, 1984 to read \$66,547.00. Work was still ongoing at the end of fiscal year 1984.

Construction of Contract No. S80-0854
Alternate Power Source, Nut Island
Sewage Treatment Plant

This contract was awarded to the Chappy Corporation of Chelsea, Massachusetts for a bid price of \$259,000.00. The contract was signed on September 8, 1983 and work was not completed at the end of fiscal year 1984.

Contract No. S81-0819
Installation of New Bar Screens, Nut Island
Sewage Treatment Plant

This contract was awarded to P.R. Johnson, Inc. on September 9, 1982. Total construction cost was not to exceed \$39,241.44 and work was accepted as complete on April 5, 1983.

Design of Contract No. S81-0947
Chlorination System Modifications, Nut Island
Sewage Treatment Plant

This contract was awarded to Perkins/Jordan of Reading, Massachusetts by the Commission on June 10, 1982 for a cost of \$148,071.00. The contract was signed by the Commission in March 31, 1983 and was later amended on May 31, 1984 for a new total of \$206,890.00 due to an increase in the scope of services. Work was not complete at the end of fiscal year 1984.

Phase A of Contract No. S81-0947-C1A
Chlorination System Modifications - Phase A
Nut Island Sewage Treatment Plant

This construction contract was awarded to P.R. Johnson, Inc. for a bid price of \$462,000.00. The contract was signed on April 21, 1983 and was amended on February 9, 1984 for a new total of \$494,666.23. Work was accepted as complete on February 10, 1984.

Phase B of Contract No. S81-0947-C2A
Chlorination System Modifications - Phase B
Nut Island Sewage Treatment Plant

This construction contract was awarded to P.R. Johnson, Inc. for a bid price of \$1,168,264.00. The contract was signed on April 5, 1984 and work was ongoing at the end of fiscal year 1984.

Contract No. S82-1008
Study and Design to Secure or Replace Floating Covers
on Digesters 3 and 4, Nut Island Sewage Treatment Plant

This consultant contract with Tighe and Bond/SCI Consulting Engineers was signed by the Commission March 11, 1982 for study and design services not to exceed \$110,462.00 and was not completed at the end of fiscal year 1984.

Construction of Contract No. S82-1008
Rehabilitation of Digesters 3 and 4 with Replacement
of Floating Covers and Gas Recirculation Equipment,
Nut Island Sewage Treatment Plant

This construction contract was awarded to Gaffny Plumbing and Heating Corporation for a bid price of \$1,593,000.00. The Commission signed the contract on May 12, 1983 and work was ongoing at the end of fiscal year 1984.

Contract No. S83-1105
Engine Maintenance Program at
Nut Island Sewage Treatment Plant

This contract was awarded to Creole Production Services, Inc. on December 1, 1983 for a bid price of \$76,690.00. The Commission signed the agreement on February 2, 1984. Work was not complete at the end of fiscal year 1984.

PUMPING STATIONS

Study of Contract No. S80-0811-S1A
Study for Relief or Rehabilitation of the Braintree-Weymouth
Pump Station and Interceptor

This study contract with C.E. Maguire, Inc. of Waltham, Massachusetts was signed by the Commission on November 5, 1981 for a total cost not to exceed \$397,659.00. The contract was not completed at the end of fiscal year 1984.

Study of Contract No. S80-0828
East Boston Pumping Station Facilities Plan

This consultant contract with Metcalf and Eddy, Inc. of Boston, Massachusetts was signed by the Commission on September 3, 1981 for a study cost not to exceed \$422,570.00. The facilities plan was accepted as complete on April 30, 1983.

Contract No. S80-0828-D1A
East Boston Pumping Station Design and
Construction Administration Services

This contract was awarded to Metcalf and Eddy, Inc. of Boston, Massachusetts. The Commission signed the contract on January 26, 1984 for a total amount of \$1,773,830.00. Work was ongoing at the end of fiscal year 1984.

Contract No. S80-0851
Screening Container System, All Sewage Pumping Stations

This contract was awarded to SEA Consultants on September 18, 1980, at a total design cost not to exceed \$39,952.00. The contract was signed on October 17, 1980 and was not completed at the end of fiscal year 1984.

Contract No. S81-0201-D1A
Reading Pumping Station Design and
Construction Administration Services

This contract was awarded to SEA Consultants, Inc. for the amount of \$461,681.00. The contract was signed by the Commission on June 23, 1983. Work was ongoing at the end of fiscal year 1984.

Contract No. S81-0948-D1A
Upgrade Instrumentation at Alewife Brook
Pumping Station

This design contract was awarded to Russell H. Babcock Consulting Engineers, Inc. for a bid price of \$17,496.88. The Commission signed the contract on March 10, 1983 and work was not completed before the end of fiscal year 1984.

Contract No. S81-0948-C1A
Upgrade Instrumentation at Alewife Brook
Pumping Station

This construction contract was awarded to Ryan Electric Company for a bid price of \$37,500.00. The Commission signed the agreement on May 3, 1984. Work was not complete at the end of fiscal year 1984.

Study of Contract No. S82-1011
Charlestown Pumping Station
Charlestown, Massachusetts

This contract was awarded to Camp, Dresser and McKee, Inc. of Boston, Massachusetts on August 12, 1982. The total study cost was not to exceed \$291,725.00 and was accepted as complete on February 17, 1984.

Contract No. S82-1011-D1A
Charlestown Pumping Station Design and
Construction Administration Services

This contract was awarded to Camp, Dresser and McKee, Inc. of Boston, Massachusetts for the amount of \$855,558.48. The Commission signed the agreement on March 8, 1984. Work was ongoing at the end of fiscal year 1984.

Contract No. S83-1095
Repair No. 1 Pump Braintree-Weymouth
Pump Station

This contract was awarded to Harding & Smith on March 24, 1982. Total construction cost is not to exceed \$4,832.00. This contract was accepted as complete on September 21, 1983, however, the Contractor has submitted a claim for additional costs.

Contract No. S83-1102
Pavement Repair, Squantum Pumping Station

This construction contract was awarded to South Shore Paving Company of Milton, Massachusetts on September 29, 1983. The contract was signed by the Commission on October 13, 1983 for a price of \$2,790.00. Work was not complete at the end of fiscal year 1984.

Contract No. S78-0651
Facilities Planning for the Control of Combined
Sanitary Sewage and Stormwater Discharge in
Boston Harbor and its Tributary Rivers

This contract was awarded to Camp, Dresser and McKee, Inc. of Boston, Massachusetts for the Dorchester Bay area. Camp, Dresser and McKee was also lead consultant for the entire C.S.O. Facility Plan. The consultant started work June 14, 1978 and the work is ongoing. The initial contract price was \$1,440,480.00.

Contract No. S78-0653
Facilities Planning for the Control of Combined
Sanitary Sewage and Stormwater Discharge in
Boston Harbor and its Tributary Rivers

This contract was awarded to Metcalf and Eddy, Inc. of Boston, Massachusetts for the Charles River Basin area. The consultant started work on June 15, 1978 and the work is ongoing. The initial contract price was \$1,118,855.00.

Design of Contract No. S80-0874
Old Stony Brook Conduit Connection to the Boston Main
Drainage Relief Sewer and the Goldsmith Brook Conduit
Relocation, also, Assistance to the MBTA for the Design of a
Force Main Crossing the Southwest Corridor at Gordon Street

This contract was awarded July 2, 1980 to Metcalf and Eddy, Inc. at a design cost of \$267,579.00 which was amended on June 14, 1984 to read \$301,841.00. It was not complete at the end of fiscal year 1984.

Construction of Contract No. S80-0874
Old Stony Brook Conduit Connection to the Boston Main
Drainage Relief Sewer and the Goldsmith Brook Conduit
Relocation, also, Assistance to the MBTA for the Design of a
Force Main Crossing the Southwest Corridor at Gordon Street

This construction contract was awarded to Cruz Construction Company/Modern Continental/Mahoney Construction Company by the MBTA in May 1982. The total bid price is \$3,800,000.00. Work was not complete at the end of fiscal year 1984.

Contract No. S83-1022-DIA
Fox Point/Commercial Point CSO

This contract was awarded to Hayden-Wegman, Inc. of Boston, Massachusetts. The design cost is \$256,000.47 and the construction cost is \$39,819.39 making a total of \$295,819.86. The Commission signed the contract on May 3, 1984 and Notice to Proceed was given on May 14, 1984. Work was ongoing at the end of fiscal year 1984.

Design of Contract No. S83-1044
Constitution Beach CSO Facility
East Boston, Massachusetts

This contract was awarded to Hayden, Harding and Buchanan, Inc. of Boston, Massachusetts at a design cost not to exceed \$73,212.00 on March 29, 1983. This contract was signed May 5, 1983 and was not completed at the end of fiscal year 1984.

Contract No. S84-1113
Study of Moon Island/Calf Pasture

This contract was awarded to Camp, Dresser and McKee, Inc. of Boston, Massachusetts on January 26, 1984. The bid price was \$39,932.00. Work was not complete at the end of fiscal year 1984.

INTERCEPTORS

Contract No. S77-0484
Study and Design of Hingham Force Main and
Pumping Station, Hingham, Massachusetts

This contract was awarded to Anderson-Nichols on June 24, 1982 at a cost of \$133,921.27. This was later amended on December 8, 1983 for a new contract total of \$230,236.67. Work was not complete at the end of fiscal year 1984.

Contract No. S77-0484-C1A
Construction of Hingham Force Main

This contract was awarded to Methuen Construction Company for a total bid price of \$839,847.00. The Commission signed the contract on September 15, 1983. Work was not completed at the end of fiscal year 1984.

Contract No. S79-0655-S1A
Study for the Relief of the Framingham Extension Sewer

This study contract with Anderson-Nichols/Hazen and Sawyer (Joint Venture) was signed by the Commission on November 30, 1978 for a total cost of \$285,775.00. The last amendment was signed on May 28, 1981 bringing the total to \$316,086.15. Work was accepted as complete on January 27, 1983.

Contract No. S79-0655-D1A
Design for the Relief of the Framingham Extension Sewer

This contract was awarded to Anderson-Nichols and Company. The agreement was signed by the Commission on July 26, 1983 for a total not to exceed \$842,840.70. Work was not complete at the end of fiscal year 1984.

Contract No. S80-0738
Site Study, South Maintenance Yard

This consultant contract was awarded to Andrea Leers Associates for a bid price of \$130,000.00. The contract is under the jurisdiction of Division of Capital Planning and Operations (DCPO). DCPO is conducting the design contract with Andrea Leers Associates. Work was not complete at the end of fiscal year 1984.

Contract No. S81-0893-S1A
Study for the Relief of the Wellesley Extension Sewer

This study contract with SEA Consultants, Inc. of Boston, Massachusetts was signed by the Commission on February 15, 1981 for a total cost not to exceed \$324,948.00. Draft for Facilities Plan submitted, now awaiting regulatory review and approval before final printing. Work was not complete at the end of fiscal year 1984.

Contract No. S81-0922
New Neponset Valley Relief Sewer

This contract was awarded to Linenthal, Eisenberg and Anderson, Inc. on March 10, 1983. Notice to Proceed was sent to the Consultant on March 29, 1983. The total study cost is not to exceed \$568,162.82 and was not complete at the end of fiscal year 1984.

Contract No. S81-0938
Millbrook Valley Relief Sewer Design

This consultant contract with Weston & Sampson Engineers, Inc. was signed by the Commission on October 22, 1981 for a design cost not to exceed \$193,428.00. Amendments I, II, and III, signed on May 13, 1982, August 12, 1982 and August 18, 1983, respectively, increased the design cost to \$255,902.00, then to \$269,058.00, and then to \$311,869.00. Amendments IV and V, adding on construction administration services, were signed on March 8, 1984 and May 10, 1984 increasing the total contract value to \$571,245.43 and then to \$595,886.43. Design was accepted as complete by the Commission on April 30, 1984.

Contract No. S82-1004
Kilby Street Culvert Repair
Quincy, Massachusetts

This contract was awarded to PRC Harris and was signed on January 27, 1983. Total design cost is not to exceed \$33,156.00. This contract was not complete at the end of fiscal year 1984.

Contract No. S83-1006
Design of Slade Siphon at Mill Creek

The contract was awarded to Gannett Fleming Corddry and Carpenter, Inc. for a contract amount not to exceed \$84,465.00. The contract is dated September 22, 1983. Work was not complete at the end of fiscal year 1984.

Contract No. S83-1025
Repair of Belle Isle Siphon

The consultant contract was awarded by the Commission to Fay Spofford and Thorndike on June 23, 1983. The total contract value is not to exceed \$49,990.00. Work was not complete at the end of fiscal year 1984.

INDUSTRIAL WASTE

Contract No. S78-0657
Secondary Waiver Application

This contract was awarded to Metcalf and Eddy, Inc. of Boston, Massachusetts on May 17, 1978 at a study cost not to exceed \$440,000.00. It was amended on June 7, 1979 to read \$935,778.00. In answer to EPA's request for further information an amendment was signed on January 21, 1982 at a cost not to exceed \$450,000.00. After EPA's June 30, 1983 tentative denial of the waiver application, an amendment was signed on November 10, 1983 at a cost not to exceed \$430,000.00 to perform the studies required to submit a reapplication for a waiver. On April 12, 1984 an additional amendment was signed at a cost not to exceed \$445,342.00 for the performance of an EPA required summer sampling program. The reapplication for the waiver was submitted to EPA on June 30, 1984.

Contract No. S78-0658
Establish Municipal/Industrial Permit System and to Conduct
Industrial Waste Survey and a Pretreatment Program and to
Establish and Develop User Charge and Industrial Cost Recovery
System to Comply with Federal Law and Related Rules and Regulations

This contract was awarded to Black and Veatch, Consulting Engineers of Kansas City, Missouri on July 13, 1978 at a bid price of \$2,179,500.00 which was last amended January 19, 1983 to read \$2,403,700.00. This amendment was necessitated by a court case (City of Quincy vs MDC), the scope of which was written to comply with the court order. The original contract was signed on August 3, 1978. Notice to Proceed was given September 8, 1978. The ongoing contract was not completed at the end of fiscal year 1984.

Contract No. S83-0930
Analytical Testing for Monitoring Program

This consultant contract was awarded to Perkins Jordan, Inc. of Portland, Maine. The contract was signed on May 3, 1984 for a cost not to exceed \$40,000.00. Work was ongoing at the end of fiscal year 1984.

UNITS OF MEASURE USED THROUGHOUT REPORT

cu.	=	cubic
ft. or '	=	feet
gr.	=	grains
gal. or Gal.	=	gallons
gpd or GPD	=	gallons per day
hp	=	horsepower
in. or "	=	inches
K	=	denotes units of one-thousand (1000)
kg	=	kilograms
l	=	liters
lbs.	=	pounds
MGD	=	million gallons per day
MF	=	membrane filter
met.	=	meters
Mil.	=	million
mg	=	milligram
ml	=	milliliters
ppm	=	parts per million (approximately equal to milligrams per liter)
rpm	=	revolutions per minute

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